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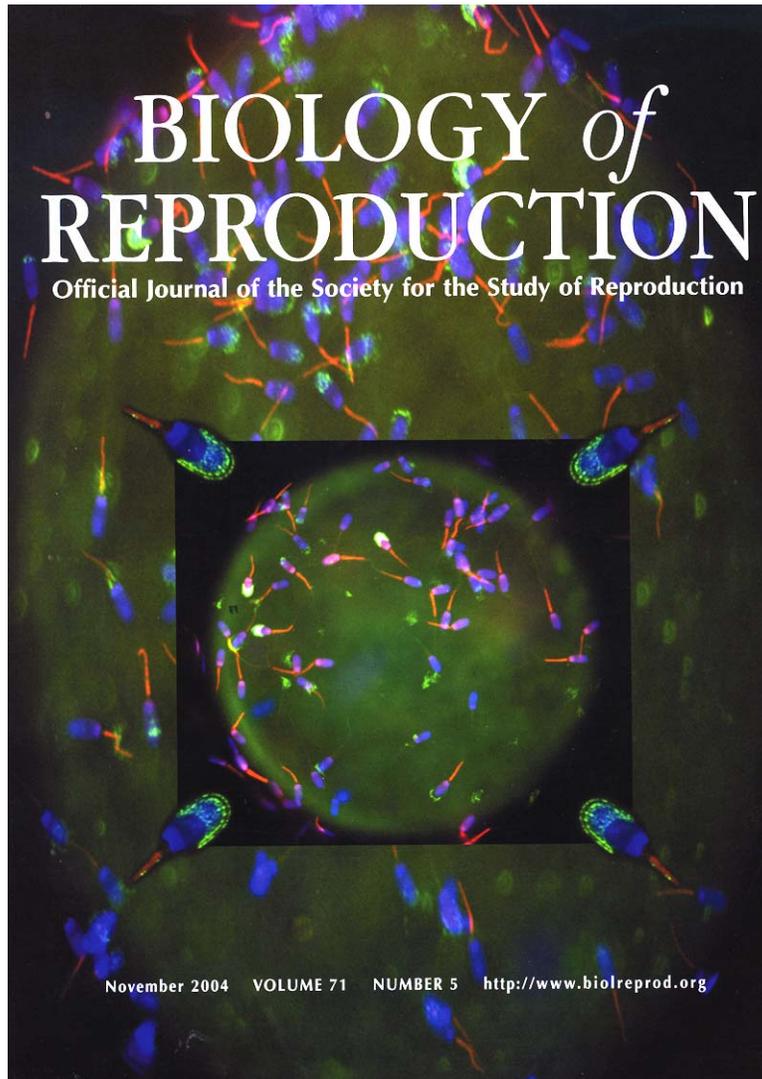
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*P. Sutovsky, G. Manandhar, T. C. McCauley, J. N. Caamano, M. Sutovsky, W. E. Thompson, and B. N. Day. November 2004. Proteasomal Interference Prevents Zona Pellucida Penetration and Fertilization in Mammals. **Biology of Reproduction** 71(5):1614-1624*

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During fertilization in farm animals, the fertilizing sperm cell must penetrate the egg's protective coat or zona pellucida. Protease enzymes, the protein-based molecules that can digest other proteins, are believed to digest the fertilization slit in the egg's zona to facilitate sperm-egg fusion and fertilization. The identity of these enzyme molecules is not known and often hotly debated among fertilization biologists. NRI sponsored research by Sutovsky et al., (2004) shows that sperm cells carry a special type of protease enzyme, called the proteasome, in the cap at the tip of the sperm head. This cap releases the proteasomes when the sperm head binds to the egg's zona, causing its digestion and sperm penetration through it. Consequently, pharmaceutical compounds designed to block proteasomal digestive function and antibodies that bind to the proteasome eliminate proteasomal activity and prevent zona penetration during fertilization in a test tube. These findings have direct implications for the development of embryo transfer technology in farm animals, where the modulation of sperm proteasomal activity during fertilization for embryo production could reduce the number of embryos discarded because of simultaneous, unwanted penetration by multiple spermatozoa. It is also possible that the administration of anti-proteasomal drugs or active immunization against proteasomal activity could be employed as a means of controlling reproductive function in humans, as well as in farm animals and pets.

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